



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6  
1445 ROSS AVENUE, SUITE 1200  
DALLAS, TX 75202-2733

MAR - 8 2016

CERTIFIED MAIL 7014 0150 0000 2452 5332 RETURN RECEIPT REQUESTED

Mr. Paul Wachtendorf  
Site Director  
INEOS Nitriles - Green Lake Complex  
P.O. Box 659  
Port Lavaca, TX 77979

RE: INEOS Nitriles USA LLC (INEOS) Proposed Petition Reissuance Approval Decision for  
Wells WDW-163, WDW-164, and WDW-165

Dear Mr. Wachtendorf:

Based on a detailed technical review of the submitted petition reissuance including supporting documents, I am proposing to approve INEOS's request for reissuance of the exemption to the land disposal restrictions of the Hazardous and Solid Waste Amendments of 1984, to the Resource Conservation and Recovery Act. This exemption applies to existing wells WDW-163, WDW-164 and WDW-165. Enclosed are the public notice and fact sheet associated with this proposed decision. A final decision regarding the INEOS petition reissuance will be made after the end of the public comment period.

We appreciate your cooperation during the detailed petition reissuance review process. If you have any questions or comments regarding this matter, please call Brian Graves at (214) 665-7193.

Sincerely,

A handwritten signature in blue ink, appearing to read "WK Honker", is positioned above the printed name of the signatory.

William K. Honker, P.E.  
Director  
Water Division

Enclosures

ecc: Ms. Jennifer Gibbs, INEOS Nitriles USA  
LLC Ms. Lorrie Council, TCEQ  
Mr. Richard Heitzenrater, TCEQ Region 14.

PUBLIC NOTICE OF A PROPOSED HAZARDOUS WASTE EXEMPTION  
REISSUANCE APPROVAL

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 6  
1445 ROSS AVENUE  
DALLAS, TEXAS 75202-2733

The U.S. Environmental Protection Agency (EPA), Region 6, proposes to approve a petition for reissuance of an exemption to the land disposal restrictions of the Hazardous and Solid Waste Amendments of 1984 (HSWA) to the Resource Conservation and Recovery Act (42 U.S.C. §6901, **et seq**) for the following facility:

Applicant: INEOS Nitriles USA LLC (INEOS)  
P.O. Box 659  
Port Lavaca, TX 77979

Injection Well Numbers: WDW-163, WDW-164 and WDW-165

Development of the proposed decision was based on a detailed technical review of the submitted petition reissuance demonstration with support documents.

The land disposal restrictions prohibit the injection of untreated restricted hazardous waste. However, the amendments mentioned above provide that an exemption to these restrictions may be granted if the Administrator determines that the method of land disposal (i.e., injection well) is protective of human health and the environment. A method of land disposal may not be determined to be protective, "unless, upon application by an interested person, it has been demonstrated to the Administrator, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous." (42 U.S.C. § 6924 (g)(5)) Regulations establishing the criteria for petitioning for an exemption to the land disposal restrictions were published in Volume 53, Number 143 of the **Federal Register**, July 26, 1988, (53 Fed. Reg. 28118 (1988)). Those regulations are now codified at 40 CFR Part 148. A no migration demonstration was successfully made for injection wells WDW-163, 164, and 165 by BP Chemicals and an exemption to the land disposal restrictions was issued on May 17, 1990. On October 16, 1991, EPA issued a modification to the petition approval to increase the maximum allowable concentration of acetonitrile in the wastestream. On December 2, 1994, a no migration petition reissuance was approved. On August 23, 1995, a nonsubstantive revision was granted to modify the wastestream characterization petition condition. On May 18, 1999, a nonsubstantive revision was granted to add an additional hazardous waste code (F005). On September 7, 2001, a nonsubstantive revision was granted to modify the wastestream characterization petition condition. On December 1, 2004, a nonsubstantive revision was granted to recognize an ownership change from BP Chemicals to BP Amoco Chemical Company. On July 14, 2005, a nonsubstantive revision was granted to recognize an ownership change from BP Amoco Chemical Company to Innovene USA LLC. On July 13, 2006, a nonsubstantive revision was granted to recognize an ownership change from Innovene USA LLC to INEOS USA LLC.

In this current reissuance request, INEOS is raising the injection interval tops, combining the injection intervals for WDW-164 and 165, increasing the maximum allowable injection volume into WDW-163, reducing the combined maximum allowable injection volume into WDW-164 and WDW-165, modifying the allowable wastestream specific gravity range, adding P030 to the allowable waste codes for the wastestream and lengthening the operational life of the injection wells.

A final decision to approve or deny this proposed petition for reissuance of an exemption to the land disposal restrictions will be made after the close of the comment period, which ends at the close of business on May 2, 2016.

All persons, including the applicant, who wish to comment on the proposed decision may do so by submitting comments along with their name and address to the EPA address shown below. All written comments must be postmarked by May 2, 2016, to be considered in formulating a final decision. EPA is not required to hold a public hearing. However, if there is sufficient public interest in the proposed decision, EPA may hold a public hearing. Anyone desiring such a hearing must submit a written request identifying the issue(s) for discussion at the hearing to the office in Dallas, Texas, before the close of business on May 2, 2016. EPA will give at least 30 days notice of the public hearing, if a hearing is held.

Written comments, requests for information regarding the Agency's decision on this reissuance, and requests for copies of the fact sheet (description of the rationale supporting the proposed decision) should be sent to EPA Region 6 at the address shown below. Information on the Agency's decision may also be obtained by contacting Brian Graves at (214) 665-7193 or [graves.brian@epa.gov](mailto:graves.brian@epa.gov). Information is also available at: <http://www.epa.gov/uic/underground-injection-control-epa-region-6-ar-la-nm-ok-and-tx>

U.S. Environmental Protection Agency - Region 6  
Brian Graves (6WQ-SG)  
1445 Ross Avenue  
Dallas, Texas 75202-2733

The administrative record and demonstration for the proposed petition reissuance decision is available for review beginning March 16, 2016, between 8:00 a.m. and 4:00 p.m., Monday through Friday, for the extent of the comment period, at EPA's Dallas office shown above. Beginning March 16, 2016, a copy of the demonstration is also available for review during normal business hours at the following location:

Calhoun County Public Library  
200 West Mahan St.  
Port Lavaca, TX 77979  
Library Contact: Noemi Cruz – County Library Director  
(361) 552-7323 ext. 23

Pertinent EPA comment and public hearing procedures may be found in 40 CFR §124.10 - §124.12.

EPA will notify the applicant and each person who has submitted written comments of the final exemption decision. The final decision will also be published in the Federal Register.

## FACT SHEET

EPA is proposing to approve a reissuance of an exemption to the land disposal restrictions for the following injection well facility:

Applicant: INEOS Nitriles USA LLC  
Green Lake Complex

Street Address: State Highway 185 (6.5 miles south of Bloomington, TX)  
Port Lavaca, TX 77979

Mailing Address: P.O. Box 659  
Port Lavaca, TX 77979

Wells: WDW-163  
WDW-164  
WDW-165

Issuing Office: U.S. Environmental Protection Agency  
Region 6  
1445 Ross Avenue  
Dallas, TX 75202-2733

**Decision**

The Environmental Protection Agency (EPA) proposes to approve the INEOS Nitriles USA LLC (INEOS) exemption reissuance request to the land disposal restrictions for the following injection well facility:

1. Approve the Green Lake site injection wells WDW-163 for injection into the Upper Frio Sand Injection Interval and WDW-164 and WDW-165 for injection into the Middle and Lower Frio Sands Injection Interval.
2. Define injection interval and injection zone with the following correlative depths:

<b>Well</b>	<b>Injection Zone Depths (feet)</b>	<b>Injection Interval Sand(s)</b>	<b>Injection Interval Depths (feet)</b>
WDW-163	4725' - 8250' <sup>1</sup>	Upper Frio	5370' - 5710' <sup>1</sup>
WDW-164	4715' - 8250' <sup>2</sup>	Middle and Lower Frio	6595' - 8005' <sup>2</sup>
WDW-165	4715' - 8250' <sup>3</sup>	Middle and Lower Frio	6600' - 8005' <sup>3</sup>

(<sup>1</sup>WDW-163 Upper Frio Sand depths are referenced to Kelly Bushing (KB) depths on Well 163's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 10/24/83. Note that the depth for the bottom of the injection zone is approximate for WDW-163 as the well's total depth is above the specified depths.)

<sup>2</sup> WDW-164 Middle and Lower Frio Sands depths are referenced to KB depths on WDW-164's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 1/17/81.

<sup>3</sup> WDW-165 Middle and Lower Frio Sands depths are referenced to KB depths on WDW-165's Dual Induction-SFL Compensated Neutron – Formation density Log dated 3/8/81. Note that depths for the bottoms of the injection interval and injection zone are approximate for WDW-165 as the well's total depth is above the specified depths.)

3. Define the specific gravity range of the waste stream for both requested injection intervals as 1.02 to 1.07 at a surface temperature and pressure of 60°F and 1 atmosphere with a reference temperature of 60°F based on a three-whole calendar month volume weighted average specific gravity of the waste stream.
4. Define the limit for the cumulative volume injected into WDW-163, WDW-164, and WDW-165 on a monthly basis as follows:

Upper Frio Sand: (500 gpm)(1440 minutes/day)(number of days in that month) for WDW-163

Middle and Lower Frio Sands: (500 gpm)(1440 minutes/day)(number of days in that month) for WDW-164 and WDW-165 combined

5. Define the operational life of WDW-163, WDW-164, and WDW-165 to December 31, 2017.
6. Define the list of exempted waste codes as:  
  
D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D038, F005, F039 (for constituents listed in Table 6-1 of the reissuance document), K011, K013, K014, P003, P005, P030, P063, P069, P098, P101, P106, P120, U001, U002, U003, U007, U008, U009, U019, U044, U053, U057, U080, U112, U122, U123, U124, U125, U140, U147, U149, U151, U152, U154, U159, U161, U169, U188, U191, U196, U211, U213, U219, U220, U239.
8. Define the limiting concentration reduction factor as  $4 \times 10^{-9}$ .

The following explains the derivation of the proposed decision, which is categorized according to the criteria outlined in 40 CFR Part 148. [53 Fed. Reg., 28118, (7/26/88)]

### Summary

The EPA land disposal restrictions promulgated under Section 3004 of the Resource Conservation and Recovery Act prohibit the injection of restricted hazardous waste unless a petitioner demonstrates to the EPA there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. These no migration demonstrations must meet the regulatory standards promulgated in 40 CFR Part 148 Subpart C. The demonstration includes a description of the well operations, geologic siting, and waste stream characteristics. The demonstration also includes modeling strategies which incorporate all the previously mentioned information and utilize mathematical equations to predict pressure buildup and waste movement. INEOS successfully demonstrated no migration for the injection wells at the Green Lake site. In accordance with 40 CFR §148.22(a)(4),

INEOS also submitted a signed certification statement from an authorized representative verifying that all submitted materials are true, accurate, and complete.

The INEOS petition reissuance described the operation of its wells through a discussion of well construction, injection pressures, and injection volumes for all three injection wells. The site location and geologic conditions were presented through a discussion of the depositional environments, well logs, cross-sections, fluid and core data, well tests, geologic maps, and well records. The characteristics of the waste stream was described and evaluated for compatibility with the injection and confining zones and well construction materials. INEOS incorporated all this information into a modeling strategy which predicted the pressure buildup and waste movement for the two requested injection intervals at the Green Lake site. The two requested injection intervals were the Upper Frio Sand interval to be used by WDW-163 and the Middle and Lower Frio Sands interval to be used by both WDW-164 and WDW-165.

The waste plumes, under worst case conditions, were predicted to move up-gradient northeast from WDW-163 approximately 25,750 feet within the Upper Frio Sand due to waste pooling against a no flow boundary representing a pinchout in the Upper Frio Sand, 14,700 feet up-gradient northwest from WDW-164 in the Lower Frio portion of the Middle and Lower Frio Sands, and 11,300 feet up-gradient northwest from WDW-165 in the Middle Frio portion of the Middle and Lower Frio Sands, all based on 10,000 year demonstration periods. Maximum vertical waste movement is approximately 317 feet in a mud-filled borehole and 143 feet within the injection zone strata. Both of these vertical distances are within the injection zone.

In addition to the reasonably conservative data and assumptions used in the no migration petition reissuance, the demonstration is even more conservative as it excludes degradation of the hazardous constituents in the injection zone. Examples of degradation which were not considered in the no migration demonstration are adsorption, oxidation, hydrolysis, temperature, and microbiological degradation.

Therefore, after a detailed and thorough review of INEOS's petition for reissuance of the exemption, the EPA proposes that INEOS has demonstrated, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. This time period is defined by 40 CFR §148.20 as 10,000 years.

The factors considered in the formulation of this proposed petition decision are described below.

### **Hydrogeology**

According to 40 CFR §148.20(a), a petitioner must submit hydrogeologic information in order to study the effects of the injection well activity. INEOS provided hydrogeologic information in the petition which demonstrates that Underground Sources of Drinking Water (USDWs) are properly protected. The base of the lowermost USDW is at approximately 1580 feet Kelly Bushing level (KB) depth in WDW-164 and WDW-165 at the facility.

### **Artificial Penetrations**

INEOS submitted updated information on all artificial penetrations (wells) which penetrated the injection or confining zones within the area of review (AOR - area within a 2.0 mile radius of the injection well - 40 CFR §146.63) and the 10,000 year waste plume boundary. INEOS actually

submitted information on all artificial penetrations within a composite 2 mile AOR radius around all three injection wells. All of these wells were evaluated and are plugged or constructed so that no waste would migrate from the injection zone due to pressure, buoyancy, or molecular diffusion in an artificial penetration. [40 CFR §§148.20(a)(1) & (2)(i)-(iii)]

### **Mechanical Integrity Testing (MIT) Information**

To assure that the wastes will reach the injection interval, a petitioner must submit the results of pressure and radioactive tracer tests according to 40 CFR §148.20(a)(2)(iv). These tests demonstrate mechanical integrity of a well's long string casing, injection tubing, annular seal, and bottom hole cement. The tests confirm that all injected fluids are entering the approved injection interval and that no fluids are channeling up the wellbore out of the injection zone near the wellbore. This petition for reissuance request demonstrates that INEOS's disposal wells were tested and satisfy the above criteria:

<b>Well Number</b>	<b>Pressure Test</b>	<b>Radioactive Tracer Survey</b>
WDW-163	07/23/15	07/23/15
WDW-164	05.27/15	05/27/15
WDW-165	08/15/15	08/15/15

### **Regional and Local Geology**

Class I hazardous waste injection wells must be located in areas that are geologically suitable. The injection zone must have sufficient permeability, porosity, thickness, and areal extent to prevent migration of fluids into USDWs. The confining zone must be laterally continuous and free of transmissive faults or fractures to prevent the movement of fluids into a USDW and must contain at least one formation capable of preventing vertical propagation of fractures. The INEOS facility is sited in an area meeting these geologic criteria.

An evaluation of the structural and stratigraphic geology of the local and regional area determined that the INEOS facility is located at a geologically suitable site. The injection zone is of sufficient permeability, porosity, thickness, and areal extent to meet requirements stated in 40 CFR Part 148. The containment interval is laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids out of the injection zone.

The geologic conditions for the INEOS site were presented throughout the entire document with extensive discussions of the depositional environments, well logs, cross-sections, cores, well tests, and geologic maps. The geologic cross-sections demonstrated the lateral relationships of the injection and confining zones. This information justified pressure buildup and 10,000 year plume modeling assumptions. Well pressure falloff tests at WDW-163, WDW-164, and WDW-165 support the injection intervals permeability values used in the demonstration modeling.

Approximate depths to the tops of the geologic zones are as follows:

<b>Geologic Zone</b>	<b>WDW-163</b>	<b>WDW-164</b>	<b>WDW-165</b>
Confining Zone:	4540' - 4725' <sup>1</sup>	4540' - 4715' <sup>2</sup>	4550' - 4715' <sup>3</sup>
Injection Zone:	4725' - 8250' <sup>1</sup>	4715' - 8250' <sup>2</sup>	4715' - 8250' <sup>3</sup>
Injection Intervals:	Upper Frio Sand		
	Middle and Lower Frio Sands	6595' - 8005' <sup>2</sup>	6600' - 8005' <sup>3</sup>

(<sup>1</sup>WDW-163 Confining Zone, Injection Zone, and Upper Frio Sand Injection Interval depths are referenced to Kelly Bushing (KB) depths on Well 163's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 10/24/83. Note that the depth for the bottom of the injection zone is approximate for WDW-163 as the well's total depth is above the specified depths.)

<sup>2</sup> WDW-164 Confining Zone, Injection Zone, Middle and Lower Frio Sands Injection Interval depths are referenced to KB depths on WDW-164's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 1/17/81.

<sup>3</sup> WDW-165 Confining Zone, Injection Zone, Middle and Lower Frio Sands Injection Interval depths are referenced to KB depths on WDW-165's Dual Induction-SFL Compensated Neutron – Formation density Log dated 3/8/81. Note that depths for the bottoms of the injection interval and injection zone are approximate for WDW-165 as the well's total depth is above the specified depths.)

### **Modeling Strategy**

According to 40 CFR §148.21(a)(3), in demonstrating no migration of hazardous constituents from the injection zone, predictive models shall have been verified and validated, shall be appropriate for the specific site, waste streams, and injection conditions of the operation, and shall be calibrated for existing sites. The modeling strategy for INEOS's no migration demonstration consisted of a combination of numerical and analytical models. All the models used were identified as being verified and validated according to the information submitted in the petition for reissuance request. This information consisted of actual model documentation or references of methods or techniques that are widely accepted by the technical community. The petition reissuance document described the predictive models used and demonstrated the above criteria are met.

According to 40 CFR §148.21(a)(5), reasonably conservative values shall be used whenever values taken from the literature or estimated on the basis of known information are used instead of site-specific measurements. Many variables were required to be quantified in order to use the models in the petition for reissuance request. All parameters were conservatively assigned to produce worst case conditions for pressure buildup and waste movement.

According to 40 CFR §148.21(a)(6), a petitioner must perform a sensitivity analysis in order to determine the effect of uncertainties associated with model parameters. INEOS provided this sensitivity analysis in its petition for reissuance request by varying geological and reservoir parameters in modeling scenarios for the two requested injection intervals. Through conservative model parameter assignments within this analysis, worst case scenarios for pressure buildup and waste movement were investigated and reported.

INEOS's initial reissuance demonstration modeling was based on three requested injection intervals: the Upper, Middle, and Lower Frio Sands. Radioactive tracer surveys compiled over several years indicated that upward flow was occurring from the Lower Frio Sand to the Middle Frio Sand through WDW-164's wellbore. Efforts to re-establish hydraulic isolation between the two sands through coiled tubing cleanout procedures in WDW-164 were unsuccessful. Accordingly the reissuance request was revised to combine the Middle and Lower Frio Sands into a single requested injection interval, reducing the number of requested injection intervals to two.

Despite the revised reissuance request condition for combining the Middle and Lower Frio Sands injection intervals into a single interval, INEOS was able to utilize the originally submitted reissuance modeling demonstrations for the final demonstration. Initially, INEOS modeled 500 gpm injection into



WDW-164 in the Lower Frio Sand and 500 gpm into WDW-165 in the Middle Frio Sand. After combining the Middle and Lower Frio Sands into a single requested interval, INEOS reduced the total requested future injection rate into the combined interval to only 500 gpm to be divided between WDW-164 and WDW-165. The original demonstration modeling used 1000 gpm total into WDW-164 and WDW-165. Consequently, the requested worst future injection volume of only 500 gpm into the combined Middle and Lower Frio Sands interval was conservatively modeled for future plume and pressure buildup impacts using the original submittal with a total injection rate of 1000 gpm for the demonstration modeling.

INEOS incorporated two timeframes, the operational and post-operational periods, to complete the modeling demonstration for the petition reissuance request for the two injection intervals. The operational period consisted of a historical injection period for each of the three Frio Sands (Upper, Middle, and Lower) followed by a projected worst case injection volume forecast period for each sand. Since the original demonstration modeling was employed, the historical injection period accounted for injection volume into WDW-163 completed in the Upper Frio Sand, WDW-164 completed into the Lower Frio Sand, and WDW-165 completed in the Middle Frio Sand. The operational periods in each of the three sands included historical injection from the beginning of well operations through the end of 2007 into each interval followed by the maximum future injection volume for each of the three sands with the same completions through December 31, 2017, to predict the maximum pressure buildup. The 10,000 year post injection period for each sand was modeled to predict the maximum vertical molecular diffusion and pressure permeation and the horizontal drift of the waste plumes.

To determine appropriate values to be used in the no migration demonstration, INEOS reviewed site specific data acquired during the drilling and coring, logging, geologic mapping, well testing, and mechanical integrity testing of WDW-163, WDW-164, and WDW-165. INEOS also reviewed available offset well information and applicable literature. Appropriate estimation techniques and testing protocols were used in accordance with 40 CFR §148.21(a)(2). A range was assigned to some parameters to maximize their impact on the demonstration. For example, higher permeabilities were assigned to maximize the lateral waste plume movement while lower permeabilities were assigned to maximize the predicted pressure buildup from injection operations in the two requested injection intervals: the Upper Frio Sand and the Middle and Lower Frio Sands.

No offset injection wells were found to be completed into the injection intervals for WDW-163, WDW-164, and WDW-165. Accordingly no offset injection well effects are included in the demonstration modeling. No offset area oil and gas production was found within the Upper, Middle, and Lower Frio Sands, so no offset production effects were incorporated into the demonstration modeling. The Upper Frio Sand pinches out approximately 19,500 feet to the north of WDW-163, running along a southwest to northeast trend. The pinchout was included in the demonstration modeling for the Upper Frio Sand injection interval as a sealing boundary. No other faulting or other boundaries were present in the Middle and Lower Frio Sands, so no boundary effects were incorporated into the demonstration modeling for those two sands.

A conservative 10,000 year plume demonstration was constructed using worst-case reservoir characteristics for both of the two requested injection intervals: the Upper Frio Sand and the Middle and Lower Frio Sands to project the maximum movement of both the low and high density waste plumes. To maximize plume movement, these demonstrations reduced net thicknesses and used maximum future injection volumes and higher mobilities as compared with historical pressure transient test results from WDW-163, WDW-164, and WDW-165. The low density plumes modeled in the two requested intervals (modeled using the three individual sands) used the low end of the requested density range and

did not include a background gradient to maximize the updip plume movement. The high density plumes modeled utilized the high end of the requested density range. The resulting worst case 10,000 year low and high density plume boundaries for the Upper Frio Sand interval encompassed the limits for the Middle and Lower Frio Sands worst case low and high density plumes.

A vertical diffusion demonstration was included in this petition for reissuance request that calculated the maximum vertical movement into intact strata and a mud-filled wellbore. The demonstrations (lateral plume and diffusion) demonstrated the injected waste stream for each interval will not migrate vertically upward out of the injection zone or laterally within the injection zones to a point of discharge or interface with a USDW for the required 10,000 year demonstration period.

### **Quality Assurance**

According to 40 CFR §148.21(a)(4), the INEOS petition must demonstrate that proper quality assurance and quality control plans were followed in preparing the petition demonstrations. Specifically, INEOS followed appropriate protocol in identifying and locating records for artificial penetrations within the area of review (AOR). Information regarding the geology, waste characterization [40 CFR §148.21(a)(1)], hydrogeology, reservoir modeling, and well construction was adequately verified or bounded by worst-case scenarios within the no migration petition reissuance demonstration.

### **Geochemistry and Injected Waste Compatibility**

According to 40 CFR §148.21(b)(5), a petitioner must describe the geochemical conditions of the well site. The physical and chemical characteristics of the injection zone and the formation fluids in the injection zone were described in the petition. This description included a discussion of the compatibility of the injected waste with the injection interval. INEOS also provided evaluations which demonstrated that the waste stream would not adversely alter the confining capabilities of the injection and confining zones.

### **Characteristics of Injected Fluids**

According to 40 CFR §148.22(a), the characteristics of the injection waste stream must be adequately described. These characteristics are described in the petition reissuance and the descriptions are adequate and complete. The demonstration included injectate waste analysis that conformed to the standards outlined in 40 CFR §148.21(a)(1).

#### **1. Operational Life**

End of Operational Life: December 31, 2017

Maximum Incremental Pressure Buildup (by requested interval):

Upper Frio Sand Interval:	253 psi in WDW-163
Middle and Lower Frio Sand Interval:	767 psi in WDW-164 (Lower Frio Sand) 615 psi in WDW-165 (Middle Frio Sand)

#### **2. 10,000 Year Post-Injection Period**

Background Gradient: 0 ft/yr updip and 0 ft/yr downdip

Waste Density Effects Considered: Yes

Movement Due to Hydrocarbon Production Included: No, as none occurs within either of the 2 requested injection intervals

Waste Concentration Reduction Factor:  $4 \times 10^{-9}$

Maximum Waste Movement (by interval):

Upper Frio Sand Interval:

Light Lateral Plume - approximately 25,750 feet (4.87 miles) updip in a northeasterly direction from WDW-163

Heavy Lateral Plume - approximately 5,750 feet (1.09 miles) in a southwesterly direction from WDW-163

Maximum Vertical Waste Movement - approximately 143 feet through intact strata and 317 feet in a mud-filled borehole

Middle and Lower Frio Sands Interval:

Light Lateral Plume - approximately 14,700 feet (2.78 miles) updip in a northwesterly direction from WDW-164 based on the Lower Frio portion of the Middle and Lower Frio Sand only and approximately 11,300 feet (2.14 miles) updip in a northwesterly direction from WDW-165 based on Middle Frio Sand portion of the Middle and Lower Frio Sand

Heavy Lateral Plume - approximately 4,250 feet (0.8 miles) downdip in a southeasterly direction from WDW-164 based on the Lower Frio portion of the Middle and Lower Frio Sand only and approximately 3750 feet (0.71 miles) downdip in a southeast direction from WDW-165 based on Middle Frio Sand portion of the Middle and Lower Frio Sand

Maximum Vertical Waste Movement - approximately 143 feet through intact strata and 317 feet in a mud-filled borehole

**Proposed Petition Reissuance Approval Conditions**

This proposed approval of a petition for reissuance of an exemption to allow the injection of restricted hazardous wastes is subject to the following conditions, which are necessary to assure that the standard in 40 CFR §148.20(a) is met. Noncompliance with any of these conditions is grounds for termination of the exemption in accordance with 40 CFR §148.24(a)(1). This proposed exemption is applicable to the INEOS injection Wells, WDW-163, WDW-164, and WDW-165, located at the Green Lake Complex in Port Lavaca, Texas.

1. Injection of restricted waste shall be limited to the following injection zone:

<b>Well</b>	<b>Depth of Injection Zone</b>
WDW-163	4725' - 8250' <sup>1</sup>
WDW-164	4715' - 8250' <sup>2</sup>
WDW-165	4715' - 8250' <sup>3</sup>

(<sup>1</sup>WDW-163 Injection Zone depths are referenced to Kelly Bushing (KB) depths on Well 163's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 10/24/83. Note that the depth for the bottom of the injection zone is approximate for WDW-163 as the well's total depth is above the specified depths.)

<sup>2</sup> WDW-164 Injection Zone depths are referenced to KB depths on WDW-164's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 1/17/81.

<sup>3</sup> WDW-165 Injection Zone depths are referenced to KB depths on WDW-165's Dual Induction-SFL Compensated Neutron – Formation density Log dated 3/8/81. Note that the depth for the bottom of the injection zone is approximate for WDW-165 as the well's total depth is above the specified depth.)

The injection intervals shall be defined by the following correlative log depths:

<b>Well</b>	<b>Injection Intervals</b>	<b>Depth of Injection Interval</b>
WDW-163	Upper Frio Sand	5370' - 5710' <sup>1</sup>
WDW-164	Middle and Lower Frio Sands	6595' - 8005' <sup>2</sup>
WDW-165	Middle and Lower Frio Sands	6600' - 8005' <sup>3</sup>

(<sup>1</sup>WDW-163 Upper Frio Sand Injection Interval depths are referenced to Kelly Bushing (KB) depths on Well 163's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 10/24/83. Note that the depth for the bottom of the injection zone is approximate for WDW-163 as the well's total depth is above the specified depths.)

<sup>2</sup>WDW-164 Middle and Lower Frio Sands Injection Interval depths are referenced to KB depths on WDW-164's Dual Induction-SFL Compensated Neutron – Formation Density Log dated 1/17/81.

<sup>3</sup>WDW-165 Middle and Lower Frio Sands Injection Interval depths are referenced to KB depths on WDW-165's Dual Induction-SFL Compensated Neutron – Formation density Log dated 3/8/81. Note that the depth for the bottom of the injection interval is approximate for WDW-165 as the well's total depth is above the specified depth.)

2. For Wells WDW-163, WDW-164, and WDW-165, the cumulative monthly volume injected into each of the injection intervals shall not exceed that calculated as follows:

Upper Frio Sand: (500 gpm)(1440 minutes/day)(number of days in that month) for WDW-163

Middle and Lower Frio Sands: (500 gpm)(1440 minutes/day)(number of days in that month) for WDW-164 and WDW-165 combined

3. The facility shall cease injection into WDW-163, WDW-164, and WDW-165 by December 31, 2017.
4. The characteristics of the injected waste stream for WDW-163, WDW-164, and WDW-165 shall at all times conform to those discussed in Section 6.0 of the 2015 Petition Reissuance document for WDW-163, WDW-164, and WDW-165. The three-whole calendar month volume weighted surface specific gravity of the waste stream injected into each interval shall remain within a range from 1.02 to 1.07 at 60°F and 1 atmosphere with a reference temperature of 60°F. The three-whole calendar month volume weighted specific gravity average for each interval shall be calculated by multiplying each day's specific gravity value by that day's injected volume into each interval, totaling those values for the three-whole calendar month period, and dividing by that three-whole calendar month injected volume. For the purpose of the above calculation, each day's specific gravity value shall be obtained by at least one representative grab sample of the waste stream.
5. The proposed approval for injection is limited to the following hazardous wastes:

D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D038

F005, F039 (for constituents listed in Table 6-1 of the reissuance document)

K011, K013, K014

P003, P005, P030, P063, P069, P098, P101, P106, P120

U001, U002, U003, U007, U008, U009, U019, U044, U053, U057, U080, U112, U122, U123, U124, U125, U140, U147, U149, U151, U152, U154, U159, U161, U169, U188, U191, U196, U211, U213, U219, U220, U239

6. INEOS must petition for approval to inject additional hazardous wastes which are not included in Condition No. 5, above. The facility must also petition for approval to increase the concentration of any waste which would necessitate the recalculation of the limiting concentration reduction factor and the extent of the waste plume. Petition reissuances and modifications should be made pursuant to 40 CFR §148.20 (e) or (f).
7. INEOS shall annually submit to EPA the results of bottom hole pressure surveys for WDW-163, WDW-164, and WDW-165. These surveys shall be performed after shutting in each well for a period of time sufficient to allow the pressure in the injection interval to reach equilibrium, in accordance with 40 CFR §146.68(e)(1). The annual report shall include a comparison of reservoir parameters determined from the falloff test with parameters used in the approved no migration petition reissuance. This should include a comparison of the current year's test results for the static and flowing bottom hole pressures with the values demonstrated in the approved petition reissuance and a comparison of the test results for transmissibility [ $Kh/\mu$  (mD-ft/cP)] with the transmissibilities used in the approved petition reissuance demonstration for the pressure buildup and 10,000 year plume modeling.
8. INEOS shall annually submit to EPA a radioactive tracer survey and annulus pressure test for WDW-163, WDW-164, and WDW-165.
9. INEOS shall notify EPA in the event that WDW-163, WDW-164, and WDW-165 lose mechanical integrity, prior to any well work on WDW-163, WDW-164, and WDW-165, or if INEOS plans to plug WDW-163, WDW-164, and WDW-165. If any well work or plugging is being planned, INEOS shall also submit the procedures to EPA for review prior to commencing any work.
10. Upon the expiration, cancellation, reissuance, or modifications of the Texas Commission on Environmental Quality permits for WDW-163, WDW-164, and WDW-165, this exemption is subject to review. A new demonstration may be required if information shows that the basis for granting the exemption is no longer valid under 40 CFR §148.23 and §148.24.

In addition to the above conditions, this proposed approval of a petition for reissuance of an exemption is contingent on the validity of the information submitted in the INEOS petition reissuance request for an exemption to the land disposal restrictions. Any final reissuance decision is subject to termination when any of the conditions occur which are listed in 40 CFR §148.24, including noncompliance, misrepresentation of relevant facts, or a determination that new information shows that the basis for approval is no longer valid.